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TITLE OF CASE ***Do not include "a case report"***

Traumatic Soft Tissue Injury in a Male Alpaca.

SUMMARY ***Up to 150 words summarising the case presentation and outcome (this will be freely available online)***

This case describes the sedation, surgical and medical management of wounds sustained by a male alpaca after attack by a large dog .A large axillary wound was sustained and treated to facilitate healing by secondary intention; additionally the prepuce was torn and the penis prolapsed, necessitating a novel approach for its repositioning. The case includes an appropriate sedation protocol for restraint, doses for antibiosis and analgesia. Subsequent failure of the penile replacement and the need for urethrostomy and its management are described, as well as management of the post- operative azotaemia which subsequently developed and required intravenous fluid therapy, management of a concurrent hyperglycaemia and successful resolution of all problems. The alpaca has fully recovered and been returned to his herd.

BACKGROUND ***Why you think this case is important – why did you write it up?***

South American Camelids are commonly presented to veterinary surgeons who do not necessarily have expertise in their veterinary care. This case was managed using basic principles of wound management, with minimal specialist knowledge, apart from researching the required drug doses; therefore the case is a good example to the reader of what can be accomplished if referral is not an option.

CASE PRESENTATION ***Presenting features, clinical and environmental history***

A 5y.o.entire male Huacaya alpaca was presented for treatment after being attacked by a dog. The primary veterinary surgeon (PVS) sought immediate advice and referral given the severity of the injuries. Injuries comprised a 15cm laceration of the right axilla from which a large vessel had been extruded and a ventral laceration approximately 20cm long, which included the caudal prepuce; the penis had prolapsed through the laceration. The alpaca was seen to urinate despite the prolapse and was eating and drinking. The PVS administered meloxicam and clavulanic acid/amoxicillin, cleaned and protected the wounds and arranged for transport the following day, less than 24 hours after the incident.

INVESTIGATIONS ***If relevant***

Initial examination found his vital signs to be stable and within the normal range therefore he was sedated for detailed examination using the following combination administered intravenously as a mixture:

Xylazine	0.3mg/kg
Ketamine	0.3mg/kg
Butorphanol	0.1mg/kg

Close examination revealed the axillary injury shown in figure 1 and the preputial injury shown in figure 2

DIFFERENTIAL DIAGNOSIS ***If relevant***

TREATMENT ***If relevant***

The axillary injury was simply treated by surgical debridement, flushing with 0.04% chlorhexidine solution and ligation and removal of the damaged vessel. Initially Dermisol® ointment (Propylene Glycol PhEur 1.750% v/w.Malic acid 0.375% w/w.Benzoic Acid hEur 0.025% w/w.Salicylic Acid PhEur 0.006% w/w.) was applied to aid debridement.

The penis was repositioned in the prepuce by inserting a 14 gauge canine urinary catheter through the prepuce until its emergence at the wound site, the penis was anchored to the catheter using a stay suture and the catheter retracted in order to draw the penis into the prepuce. Once the penis was correctly positioned and the glans visible at the cranial prepuce the stay suture was cut and the penis released (figures 3 and 4 illustrate repositioning of the penis). The large preputial wound was partially apposed using simple interrupted non-absorbable (nylon) sutures to help retain the penis in the prepuce but still allow wound flushing and drainage.

Morphine was administered 0.1mg/kg IM QID on the day of surgery. Antibiosis was changed to ceftiofur crystalline free acid (Naxcel® , Zoetis) at a dose rate of 5.5mg/kg subcutaneously every three days and meloxicam was administered 0.5mg/kg orally every other day (Metacam® 15mg/ml oral suspension; Boehringer Ingelheim). C3 ulcers are a common sequel to stress therefore a gastric protectant was administered (ranitidine 1.7mg/kg subcutaneously once daily); all drugs apart from the morphine were administered for 18 days at which time the patient underwent further procedures and some changes to the drugs protocols were required, as described below. Both wounds underwent daily cleaning with sterile water for the first 3 days and then 0.04% chlorhexidine; the prepuce was flushed twice daily to remove debris. Dermisol® and subsequently Intrasite Gel® (propylene glycol in a partially hydrated hydrogel formulation; Smith and Nephew) applications aided healing. Battles Summer Fly Cream (N, N-Diethyl-m-toluamide 4.90% w/w) was applied after cleaning.

Sedation and debridement was repeated every seven days. Figure 5 shows the axillary wound after 12 days treatment.

18 days post presentation the penis had lost tissue viability, therefore amputation and creation of a perineal urethrostomy was performed with concurrent castration; only one testicle was found despite the owners' conviction that both had been present scrotally before the attack. Possibly one testicle was removed in the dog attack; a testosterone stimulation test can be performed if there is doubt as to the completeness of castration. Post-urethrostomy antibiosis comprised oxytetracycline 20mg/kg intravenously once daily for 6 days. This is a high dose quoted from the BVCS proceedings 2007 "Camelid Drug Formulary" and other sources do suggest lower doses. The change of antibiotic was instigated because ceftiofur had been used for a prolonged period and there was still visible pus in the wounds. The urethrostomy site was cleaned three times daily to minimise stricture formation. Meloxicam and ranitidine were continued post operatively at the doses and frequency previously described.

Whilst wound healing and function of the urethrostomy progressed well metabolic complications

developed seven days post-operatively, with the patient ceasing to eat and becoming depressed in demeanour. Blood tests revealed azotaemia (Urea = 43.8mmol/l; normal range 3.9-10.2) and a creatinine serum level of 912 µmol/l (normal range 54-177); given that all therapeutic agents being used were renally excreted, these drugs were ceased and intravenous fluid therapy (IVFT) instigated, comprising a balanced isotonic solution (Hartmanns® or Vetivex 11; Dechra) with additional 2.5% glucose to compensate for the anorexia. Thiamine was administered daily for three days and demeanour and renal parameters monitored daily. Antibiosis was changed to clavulanic potentiated amoxicillin (Combiclav®, Norbrook) given the potentially nephrotoxic effects of oxytetracycline.

24 hours after initiation of IVFT hyperglycaemia was detected (blood glucose = 20.5 mmol/l, normal range 5.1-9.1 mmol/l) and assumed to be a combination of glucose supplementation and a stress response; glucose supplementation was stopped and insulin administered once (Lente insulin,0.4IU/kg SQ) ; the blood glucose level was monitored every six hours; normal levels were restored within twelve hours. IVFT was withdrawn after 3 days as demeanour, appetite and renal parameters were normal.

OUTCOME AND FOLLOW-UP

The patient was discharged once demeanour and appetite had been seen to be normal without further supportive IVFT and once satisfactory wound healing and function of the urethrostomy was observed (figure 6). The owner was instructed to inspect the urethrostomy site daily for signs of scalding, to use fly repellent during risk periods and to observe for daily urination. Six months after initial presentation the patient remains in good health.

DISCUSSION ***Include a very brief review of similar published cases***

LEARNING POINTS/TAKE HOME MESSAGES ***3 to 5 bullet points – this is a required field***

- Safe sedation can be accomplished in SACs using commonly available drugs;
- Wound management principles can be applied for successful treatment of the "exotic" patient;
- Metabolic disturbances can be managed using IVFT and routine blood parameter monitoring.

REFERENCES ***Harvard style***

FIGURE/VIDEO CAPTIONS ***figures should NOT be embedded in this document***

Figure 1: 15cm wound to the right axilla.
Figure 2: laceration of prepuce with prolapse of penis through the wound, visible with the patient in ventral recumbency.
Figure 3: patient in lateral recumbency. a canine urinary catheter was passed from the cranial end of the prepuce caudally until its emergence into the denuded area.
Figure 4: with the patient in lateral recumbency the penis was gently anchored to the catheter using a stay suture and the catheter withdrawn from the cranial prepuce
Figure 5: the axillary wound 12 days post trauma, granulating well. Battles Summer Fly Cream applied to periphery.
Figure 6: functional urethrostomy viewed in the standing alpaca; small amount of scar tissue/swelling visible from the original attack and surgery.

OWNER'S PERSPECTIVE ***Optional***

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